Neonatal Transport for Low-Birth Weight At-Risk Infants

NASA-JSC and Texas Children's Hospital Partner to Reduce Patient Risk during Critical Neonatal Transport

A new study between NASA-Johnson Space Center and Texas Children's Hospital will explore how vibration levels affect the fragile care for critically ill newborn's during transport to its facilities.

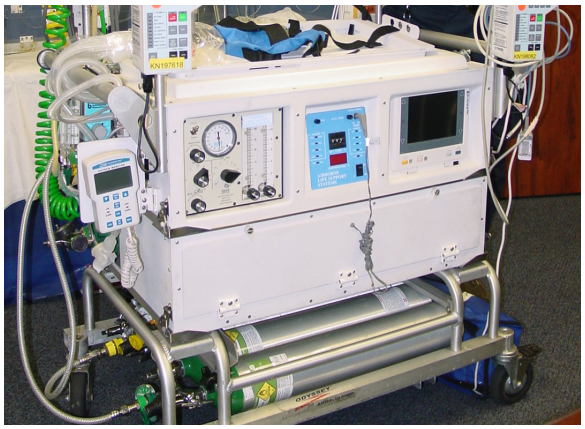
"It is critical that we understand all aspects of care, both while in our facility and while being transferred here. In order to best care for these infants, we must understand all the risks so that we may design improvements to increase the likelihood of a better outcome," said Dr. James Adams, director of Texas Children's Neonatal ICU. "This study is an important step in making that happen."

Following consultation with the Biomedical Engineering Department, Dr. James Adams, director of Texas Children's Neonatal ICU, requested the initiation of a scientific study to identify what patients are exposed to regarding vibrations during their trip to Texas Children's. A member of its "Kangaroo Crew," what Texas Children's calls its staff in the Neonatal ICU unit, Tony Bentley, suggested turning to the Space Alliance Technology Outreach Program (SATOP) for help.

Space Alliance Technology Outreach Program (SATOP), made possible through NASA grants and private funding and support from its NASA alliance partners, provides up to 40 hours of free engineering support to entrepreneurs from NASA's engineers and scientists and its SATOP alliance partner experts.

Texas Children's Hospital turned to the SATOP program and NASA engineer Scott Hafermalz from the BioMedical Systems Division, in order to test vibration levels experienced by a newborn during transport while in an incubator. The research will be performed in two phases: first to measure, capture and analyze the vibration data; and second, to provide the data to Texas Children's Hospital along with a plan to produce modified designs for the incubator transport process.

This study is focused on the most sensitive patients of this type, low birth weight (sometimes as low as 500 grams) premature infant. It is common for these children to have difficulty breathing due to the insufficient gestational time, sometimes as low as 26 weeks or less, so they require special treatment and medical equipment to survive.



Mechanical vibration in neonatal transport has been the subject of a number of studies by universities and hospitals including a study by the University of British Columbia and British Columbia's Children's Hospital in Vancouver, Canada entitled, *Vibration and noise in pediatric emergency transport vehicles: a potential cause of morbidity?* In this study, investigators Macnab, Chen, Gagnon, Bora and Laszlo found that when noise and vibration levels were measured in the most commonly used transport vehicles, they found that noise levels exceeded recommended standards and that vibration levels exceed those that are "very uncomfortable" for healthy adults.

While improvements have already been made to common transport incubators to reduce noise and vibration levels, modifications such as soft wheels, moldable gel filled mattresses, and rubber inserts over latches, more studies are needed in order to measure and identify an acceptable level of noise and vibration levels. This research will result in recommendations by NASA engineers on design enhancements to improve the safety of the entire process of infant transport.

The NASA-JSC and Texas Children's neonatal transport vibration study will provide both intangible and tangible benefits to both NASA and Texas Children's Hospital. NASA-JSC gains valuable design training for young engineers while also helping the community with vital life-saving research and recommendations. Texas Children's Hospital receives information and recommendations that will increase its ability to care for its critically ill newborns.

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